NORMAL PEDIATRIC VITAL SIGNS

	HR Beats/ min	RR Breaths /min	BP systolic mm/Hg	BP diastolic mm/Hg
Newborn 0-1 month	100-180	30-60	73-92	52-65
Infant 1-12 months	80-150	30-60	90-109	53-67
Toddler 1-3 years	75-130	25-35	95-105	56-68
Pre-School 3-5 years	75-120	22-32	99-110	55-70
School Age 5-12 years	70-110	20-30	97-118	60-76
Adolescent 13-18 years	65-105	16-22	110-133	63-83

GLASGOW COMA SCALE (GCS)

Category	For Patients <2 Years Old	For Patients >2 Years Old
Eye Opening (E)	(4) Spontaneous (3) To speech (2) To pain (1) None	(4) Spontaneous (3) To speech (2) To pain (1) None
Best Verbal Response (V)	(5) Coos, babbles (4) Irritable, cries (3) Cries to pain (2) Moans to pain (1) None	(5) Oriented (4) Confused (3) Inappropriate words (2) Incomprehensible (1) None
Best Motor Response (M)	(6) Normal spontaneous movements (5) Withdraws from touch (4) Withdraws from pain (3) Abnormal flexion (2) Abnormal extension (1) None	(6) Obeys commands (5) Localizes to pain (4) Withdrawal to pain (3) Flexion to pain (2) Extension to pain (1) None

Sources for the Pediatric Surge Quick Reference Guide can be found online at:
http://ems.dhs.lacounty.gov
www.CHLA.org/DisasterCenter

Guide last updated 2.22.13

EMERGENCY MEDICAL SERVICES AGENCY
LOS ANGELES COUNTY

Pediatric Surge Quick Reference Guide

PEDIATRIC RISKS DURING DISASTERS

System / Area	Risk
Respiratory	• Higher breaths/minute increases exposure to inhaled agents • Nuclear fallout and heavier gases settle lower to the ground and may affect children more seriously
Gastrointestinal	• May be more at risk for dehydration from vomiting and diarrhea after exposure to contamination
Skin	• Higher body surface area increases risk of skin exposure • Skin is thinner and more susceptible to injury from burns, chemicals and absorbable toxins
Endocrine	• Increased risk of thyroid cancer from radiation exposure
Thermoregulation	• Less able to cope with temperature problems with higher risk of hypothermia
Development	• Less capability to escape environmental dangers or anticipate hazards
Psychological	• Prolonged stress from critical incidents • Susceptible to separation anxiety

PEDIATRIC ASSESSMENT TRIANGLE (PAT)

AIRWAY & APPEARANCE
Mental status
Muscle tone
Body position

BREATHING
Visible movement
Work of breathing
(normal/increased)

CIRCULATION
Color

AVPU: Alert, Voice, Pain, Unresponsive - Used to assess level of consciousness or alertness in PAT

Component	Abnormal Signs
Appearance	Abnormal or absent cry or speech. Decreased response to parents or environmental stimuli. Floppy or rigid muscle tone or not moving
Breathing	Increased/excessive (nasal flaring, retractions or accessory muscle use) or decreased/absent respiratory effort or noisy breathing
Circulation	Cyanosis, mottling, paleness/pallor or obvious significant bleeding

PEDIATRIC SIGNS OF RESPIRATORY DISTRESS AND RESPIRATORY FAILURE

Respiratory distress is apparent when a child fails to maintain adequate gas exchange. As the child tires, effort and / or function deteriorate and gas exchange cannot be maintained.

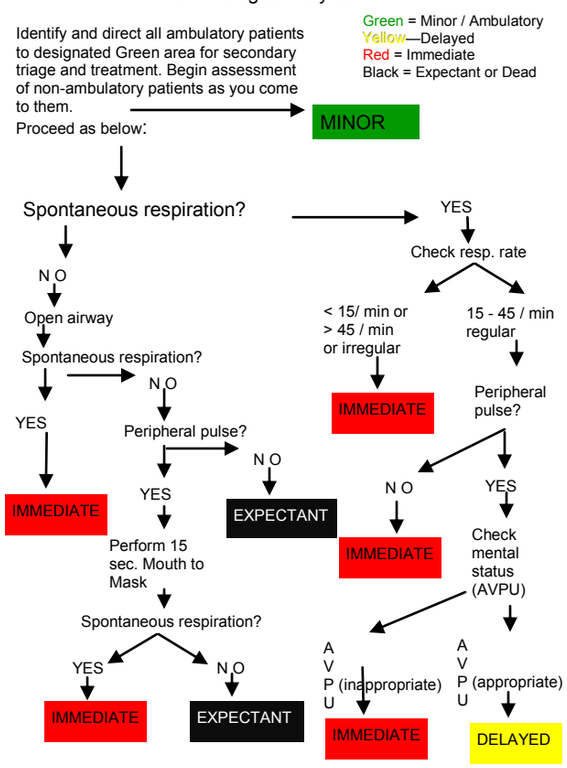
Respiratory failure *requires* intervention to prevent deterioration to cardiac arrest.

Indicators may vary with severity.

Respiratory Distress	Respiratory Failure
Tachypnea	Marked tachypnea (early)
Increased respiratory effort (nasal flaring, retractions)	Increased, decreased or no respiratory effort
Inadequate respiratory effort (hypoventilation, bradypnea)	Bradypnea, apnea (late)
Abnormal airway sounds (stridor, wheezing, grunting)	Poor to absent distal air movement
Tachycardia	Tachycardia (early), Bradycardia (late)
Pale, cool skin	Cyanosis
Changes in level of consciousness	Stupor, coma (late)

JUMPSTART FIELD PEDIATRIC MULTICASUALTY TRIAGE SYSTEM

Patients ages 1-8 years



TREATMENT PRIORITIZATION

Triage category	Description
Green Minor	Patients with mild injuries that are self-limited and can tolerate a delay in care without increasing mortality risk
Yellow Delayed	Remaining patients who do not fit in the Red or Green categories
Red Immediate	Patients who do not obey commands **Or** do not have a peripheral pulse, **Or** are in respiratory distress, **Or** have uncontrolled major hemorrhage
Black Expectant or Dead	**Expectant:** Patients who have injuries incompatible with life given the current available resources **Dead:** Patients who are not breathing after life-saving interventions

USING KILOGRAMS

Weigh all children in kilograms.
1 kg = 2.2 lbs.

Method to estimate weight:
Newborn (term): usually 3 kg
1-10 yrs.: age multiplied by 2 + 10 (kg)
>10 yrs.: age multiplied by 2 + 20 (kg)

If available, a length-based tape (e.g., Broselow Tape) may be used for weight estimation.

DAILY MAINTENANCE FLUID AND ELECTROLYTE REQUIREMENTS

	Calculation
Fluids per hour	4mL/kg/hr. for first 10 kg of weight 2mL/kg/hr. for next 10 kg of weight 1mL/kg/hr. for each kg over 20 kg
Fluids per 24 hour period	**First 10 kg** body wt. give 100mL/kg **Next 10kg** body wt. give 1000mL (for 1st 10 kg) + 50mL/kg over 10 kgs **Each kg of body wt. over 20 kg** give 1500mL (for 1st 20 kgs) + 20mL/kg
Maintenance electrolyte calculations for IV fluid	**Sodium**: 3-4 mEq/kg/day or 30-50 mEq/m2/day **Potassium**: 2-3 mEq/kg/day or 20-40 mEq/m2/day

APPROPRIATE INFANT NUTRITION

Age	
Birth - 1 mo.	2-3 ounces (60-90 mL) per feeding, breast or bottle every 2-3 hours
2-4 mos.	3-4 ounces (90-120 mL) per feeding every 3-4 hours
4-6 mos.	4-5 ounces (120-150 mL) per feeding, four or more time daily Begins baby food, usually rice cereal
6-8 mos.	6-8 ounces (180-240 mL) per feeding, four times daily Eats baby food such as rice cereal, fruits and vegetables
8-12 mos.	6 ounces (180 mL) per feeding, four times a day, Soft finger foods

Breastfeeding is best—support mothers with safe locations to breastfeed and remain hydrated

NORMAL BLOOD VOLUME

Total blood volume varies by weight. Approximate volume is 80mL/kg.
PRBC/Platelet/Albumin 5%/FFP = 10mL/kg

CLINICAL FEATURES OF DEHYDRATION

Feature	Mild (<5%)	Moderate (5% to 10%)	Severe (>10%)
Heart rate	Normal	Slightly increased	Rapid, weak
Systolic BP	Normal	Normal to orthostatic, >10 mmHg change	Hypotension
Urine output	Decreased	Moderately decreased	Markedly decreased, anuria
Mucous membranes	Slightly dry	Very dry	Parched
Anterior fontanel	Normal	Normal to sunken	Sunken
Tears	Present	Decreased, eyes sunken	Absent, eyes sunken
Skin	Normal turgor	Decreased turgor	Tenting
Skin perfusion	Normal capillary refill (<2 seconds)	Capillary refill slowed (2-4 seconds); skin cool to touch	Capillary refill markedly delayed (>4 seconds); skin cool, mottled, gray

NORMAL DEVELOPMENT

Age (years)	Growth & Development	Common Fears	Methods to Minimize Adverse Effects
0-1	Learn through senses; Seek to build trust	Needs not being met; Stranger anxiety	Speak in quiet calm voice; Involve parents in care; Be aware of stranger anxiety
1-3	Imitates others; Understands objects exist even when not seen; Attempt to control environment	Separation; Loss of control; Altered rituals	Minimize separation from family; Provide continuity of familiar routines
4-6	Vivid imagination; More independent; Shares with others	Bodily injury; Loss of control; Being left alone; Dark	Be honest; Let child make choices when able; Reinforce child not responsible for injury or illness
7-12	Understands cause and effect; Greater sense of self	Loss of control; Bodily injury; Death	Allow child to make some care decisions; Prepare before major event or surgery; Emphasize things they can do
13-18	Abstract thinking; Develops own identity	Loss of control; Altered body image; Separation from peers	Explain treatment & procedures; Encourage self-participation in care

FLUID RESUSCITATION

1. Administer 20 mL/kg of isotonic or crystalloid (NS or LR)
2. Monitor: Peripheral perfusion, Urine output, Vital signs, LOC
3. Repeat bolus if no improvement
4. Reassess status

Consider blood products in traumatic injuries requiring >40-60 mL/kg of fluid

HYPOVOLEMIC SHOCK

- Hypovolemic shock is the most common type of shock in children.
- Children increase their cardiac output by tachycardia; therefore bradycardia is an ominous sign.

Look for:
Slow irregular breathing, grunting, bradycardia, cyanosis, hypotension, decreased LOC

BURN TREATMENT: FLUID RESUSCITATION

Fluid Resuscitation Formula (0 - 12 yrs.):
3 - 4 mL x kg x %TBSA burn
(one half over 1st 8h, second 1/2 over next 16h)

For ages 0 - 2 years: Add maintenance fluid of D_5 Lactated Ringer's (in addition to resuscitation fluid above) - see fluids per hour calculation

Pediatric Considerations
- Increased fluid requirements relative to adults
- Increased surface area : mass ratio
- Hypoglycemia may occur in infants (<30 kg) due to limited glycogen reserves
- Hourly urine output to assess effective fluid resuscitation

EQUIPMENT ESTIMATIONS

Method to estimate Endotracheal Tube (ETT) size:
Tube diameter (mm) = [16 + age (y)] / 4

ETT Depth in cm at lip = 3x ETT size

EQUIPMENT SIZES: NEWBORN - 6 YEARS

Equipment	Newborn	3-6 mos.	1 year	2-3 yrs.	4-6 yrs.
Weight	3 kg	5 kg	10 kg	15 kg	20 kg
ETT	3.0-3.5	3.5-4.0	4.0-4.5	4.5-5.0	5.0-5.5
L Blade	Miller 0-1	Miller 0-1	Miller 0-1	Miller 1-2	Miller 2
Suction	6-8 Fr	8-10 Fr	10 Fr	10 Fr	10 Fr
NG Tube	5-8 Fr	5-8 Fr	8-10 Fr	10-12 Fr	12-14 Fr
Foley	6-8 Fr	6-8 Fr	8-10 Fr	10-12 Fr	10-12 Fr
Chest Tube	10-12 Fr	12-16 Fr	16-20 Fr	20-24 Fr	24-32 Fr
LMA (cuff)	1 (4 mL)	1.5 (7 mL)	2 (10 mL)	2 (10 mL)	2-2.5 (14 mL)

EQUIPMENT SIZES: 7 YEARS and OLDER

Equipment	7-9 yrs.	10-12 yrs.	13-15 yrs.	>15 yrs.
Weight	25 kg	30 kg	40 kg	> 50 kg
ETT	5.5-6.0 cuff	6.0-6.5 cuff	7.0-7.5 cuff	7.5-8.0 cuff
L Blade	Mil/Mac 2	Mil/Mac 2 -3	Mil/Mac 3	Mil/Mac 3
Suction	10 Fr	10 Fr	12 Fr	12-14 Fr
NG Tube	12-14 Fr	14-26 Fr	14-16 Fr	16-18 Fr
Foley	12 Fr	12 Fr	12-14 Fr	12-14 Fr
Chest Tube	28-32 Fr	28-32 Fr	32-40 Fr	32-40 Fr
LMA (cuff)	2.5	3 (20 mL)	3 (20 mL)	4-6 (30-50 mL)